

Determining Auditory Potential

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How to Tell when Hearing Aids are not Enough

Disclosure



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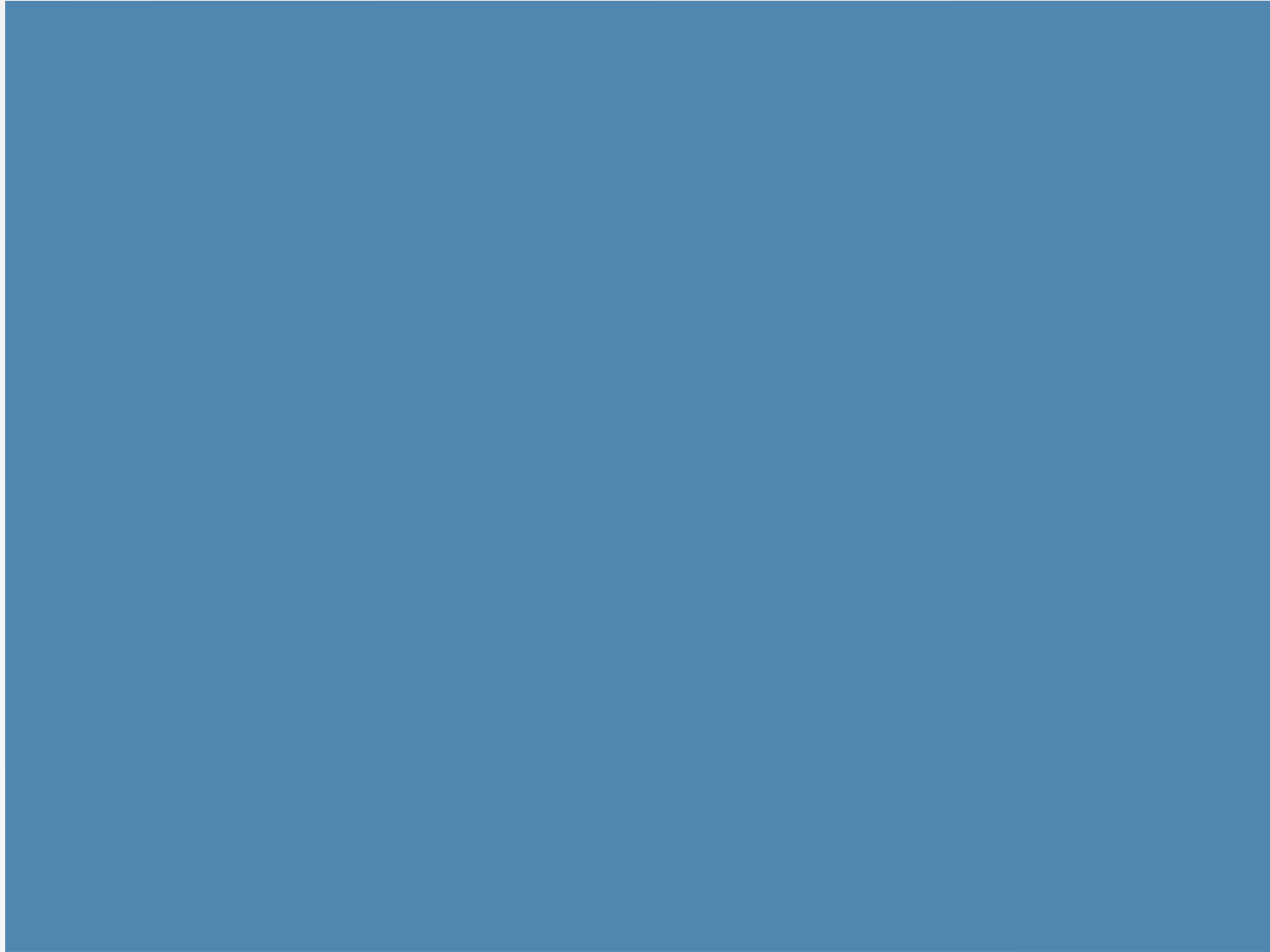
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Objectives

List two ways to assess a child's hearing potential

Compare relevant listening and talking behaviors when determining the effectiveness of hearing aids

Generate an objective discussion with intervention team members



What is Auditory Potential and Why is it Important?

What is auditory potential?

The ability to use the auditory system in a way that allows one to communicate effectively via spoken language.

This is important to

- **Help determine and/or confirm** the **effectiveness** of hearing aid(s) and/or CI candidacy **in a timely manner**
- Guide, coach, educate and empower parents to **take action**
- **Provide objective and thoughtful input** as a rehab cochlear implant team member

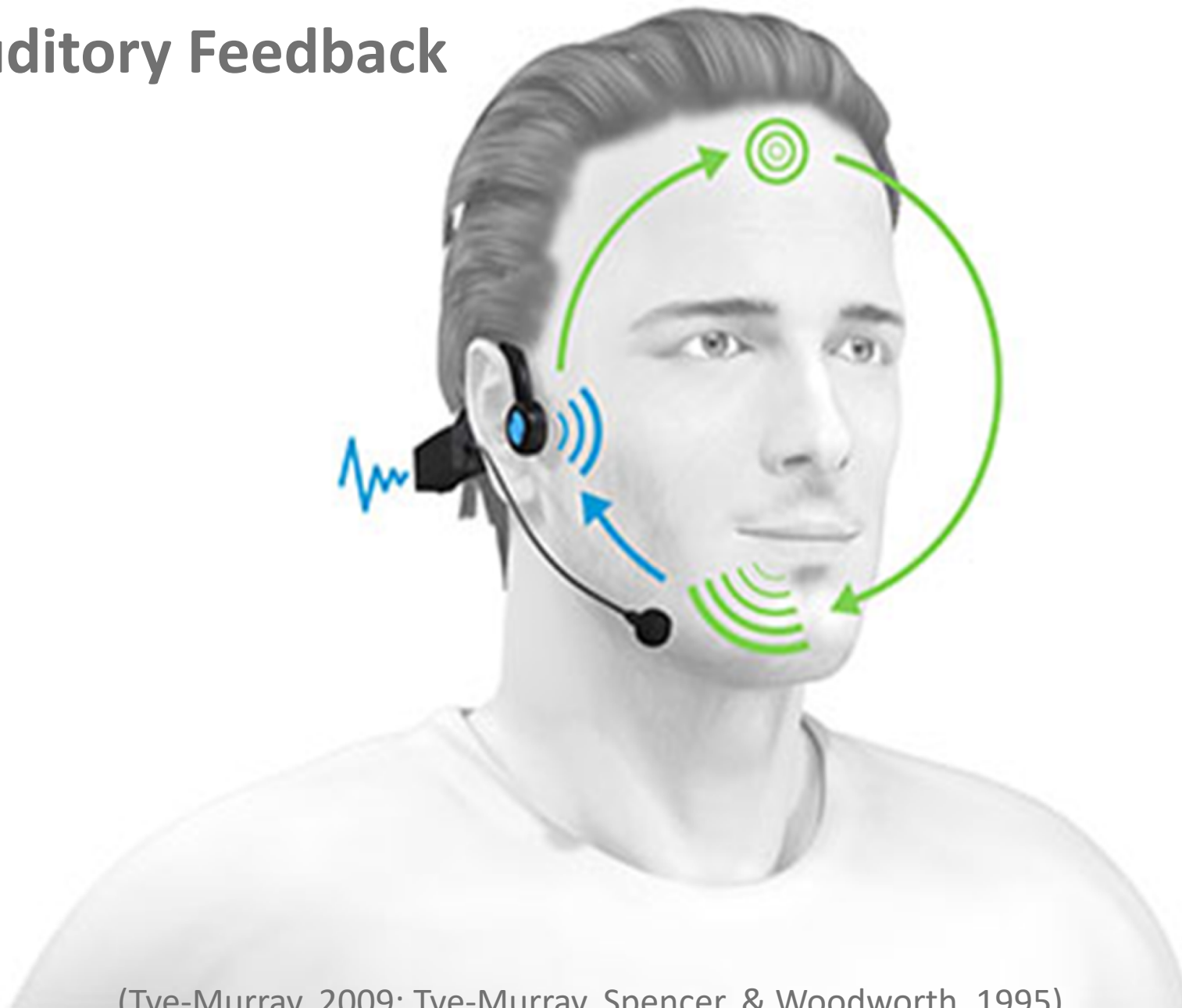
How does the Auditory System relate to Spoken Language?



Academy Organization

(Tye-Murray, 2009; Tye-Murray, Spencer, & Woodworth, 1995)

Auditory Feedback



(Tye-Murray, 2009; Tye-Murray, Spencer, & Woodworth, 1995)

What happens in the event
of
hearing loss?



**LIFE
CHANGING
EVENT**



Sound becomes filtered



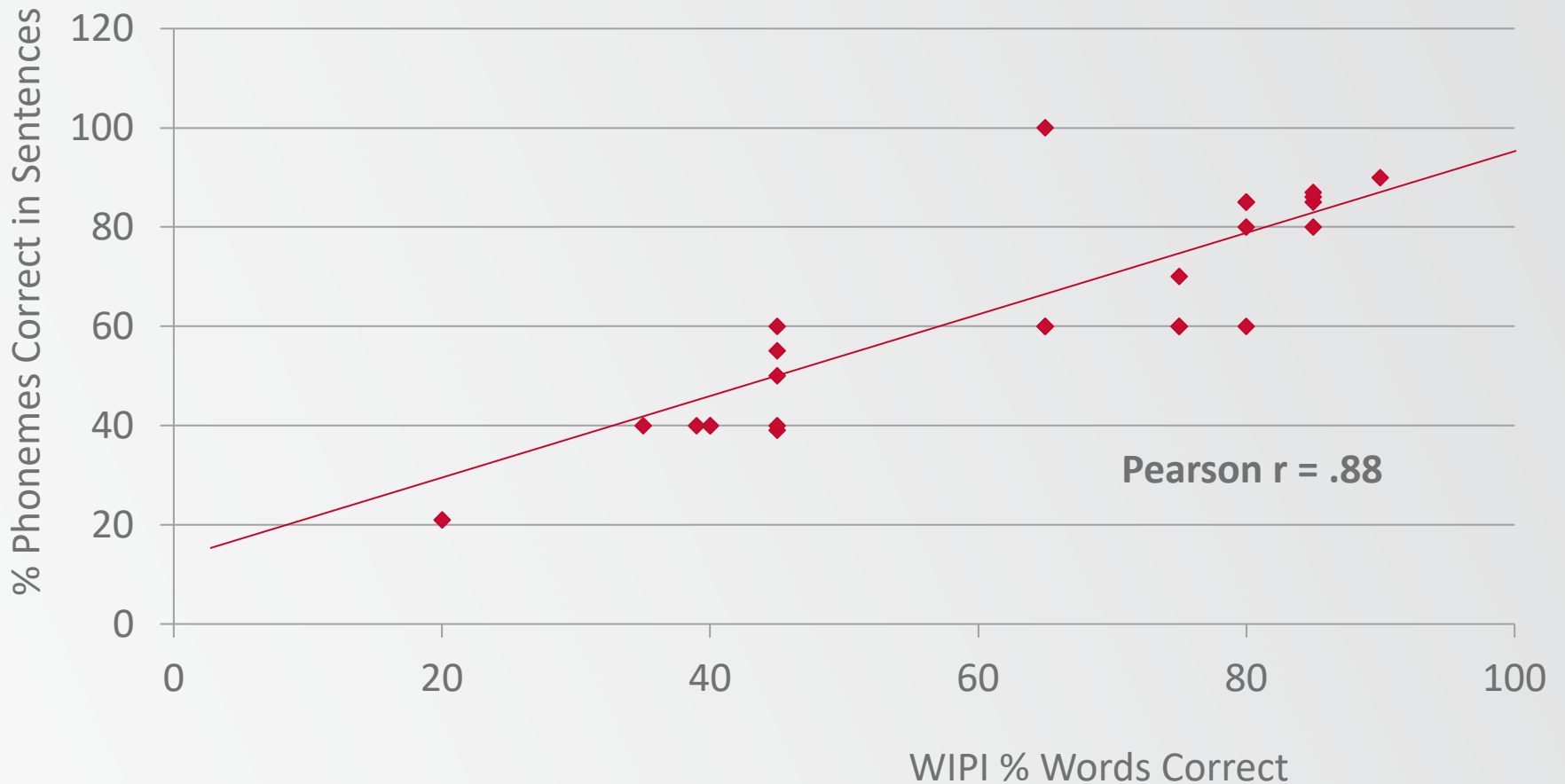
Zero distortion. Shot on the only Digital SLR with aspherical lenses.

E-300 OLYMPUS

Children Speak Like They Hear!

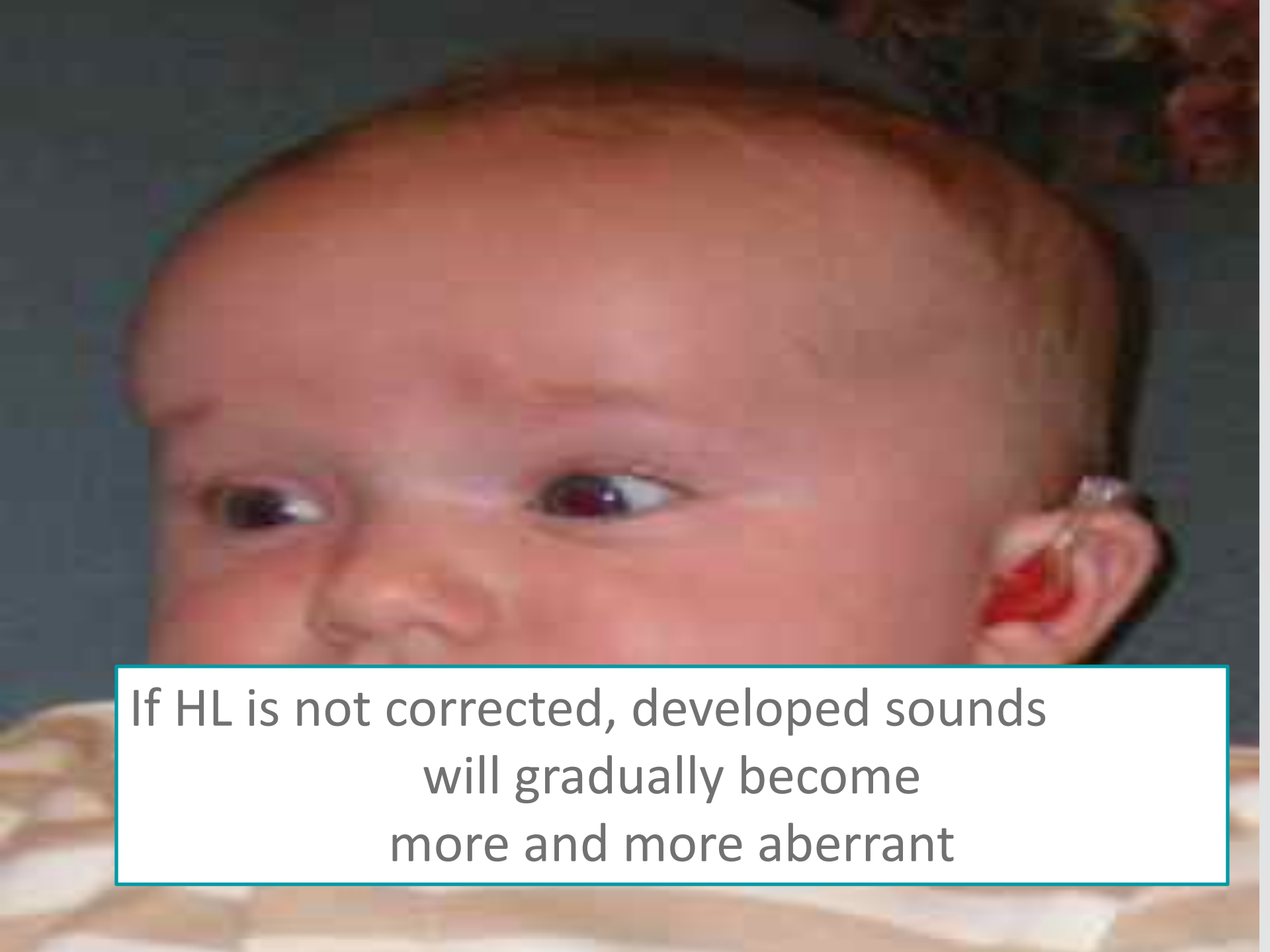
(Tye –Murray, et. al, 1997)

**Percent Phonemes Correct vs. Percent Correct on WIPI
after 5 years**




Children Speak Like they Hear





If HL is not corrected, developed sounds
will gradually become
more and more aberrant



Those without adequate access to sound
will plateau early in life.

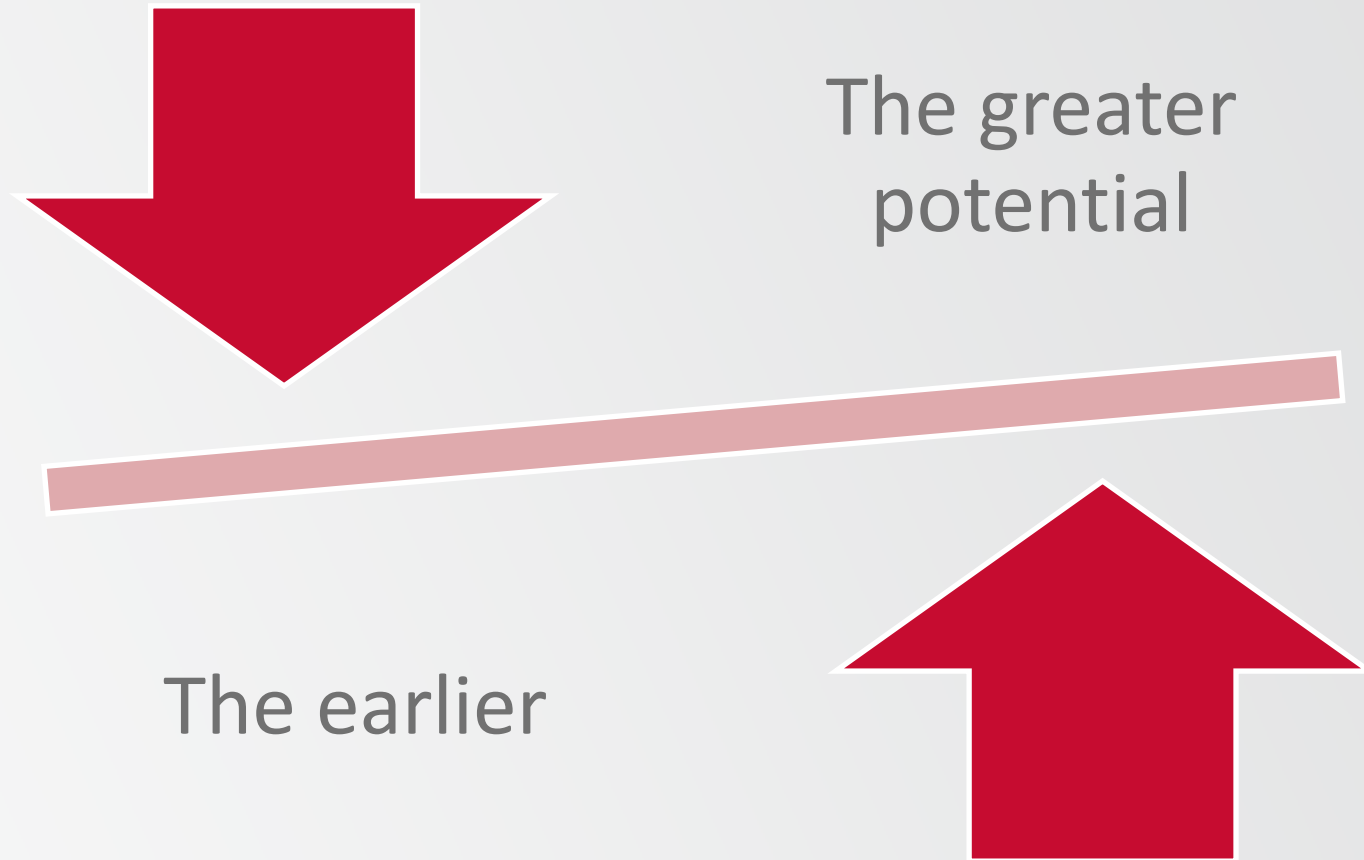
Factors that Govern Auditory Potential

For Today

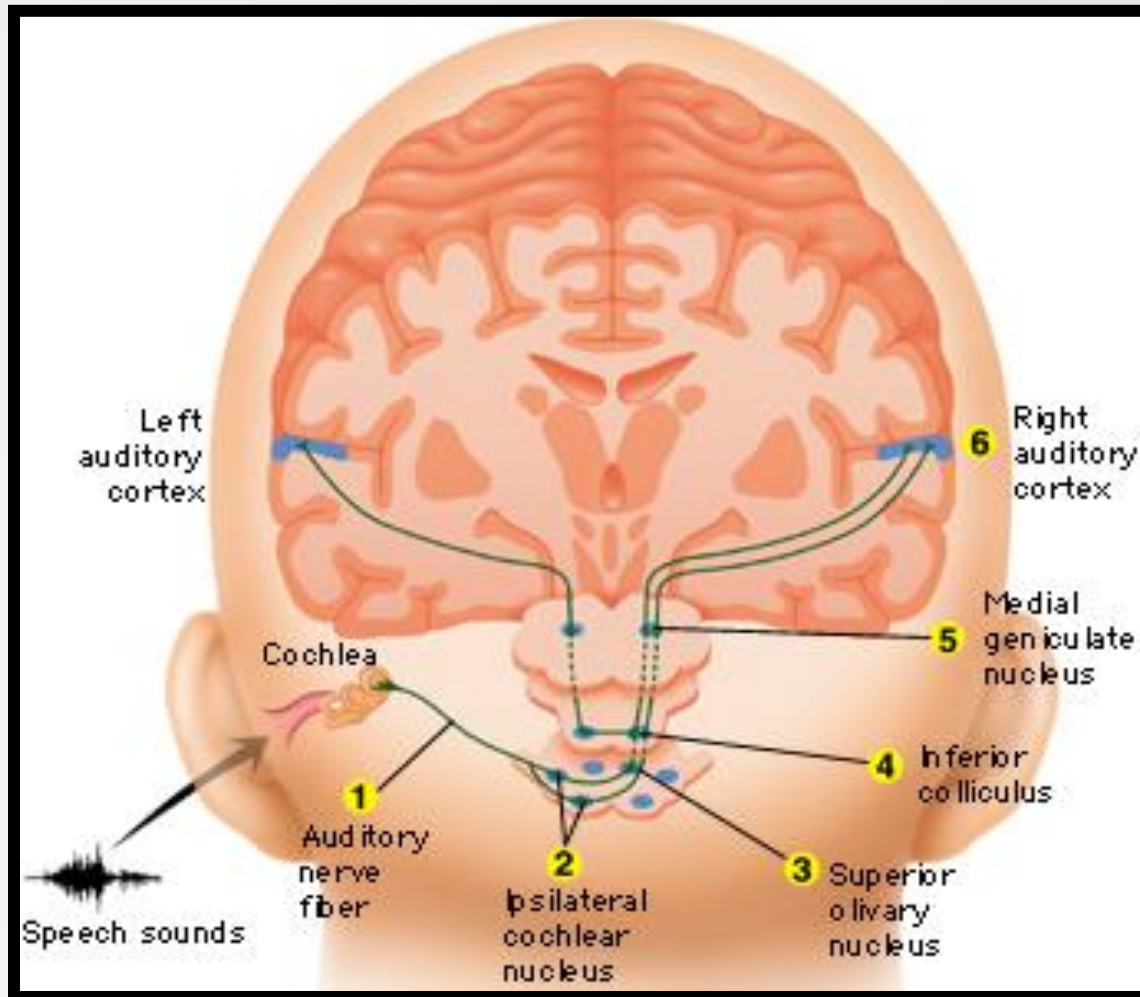
- Age of identification and Technology Fitting
- Knowledge of the Therapist
- Skills of the Therapist

Ages of Identification and Technology
fitting/activation

Age of Identification and Fitting



Keeping the Pathway Open



(Evans, Wester, & Cullen 1983; Merzenich & Kaas, 1982; Patchett, 1977; Robertson & Irvine, 1989; Webster, 1983).

Cortical Stimulation

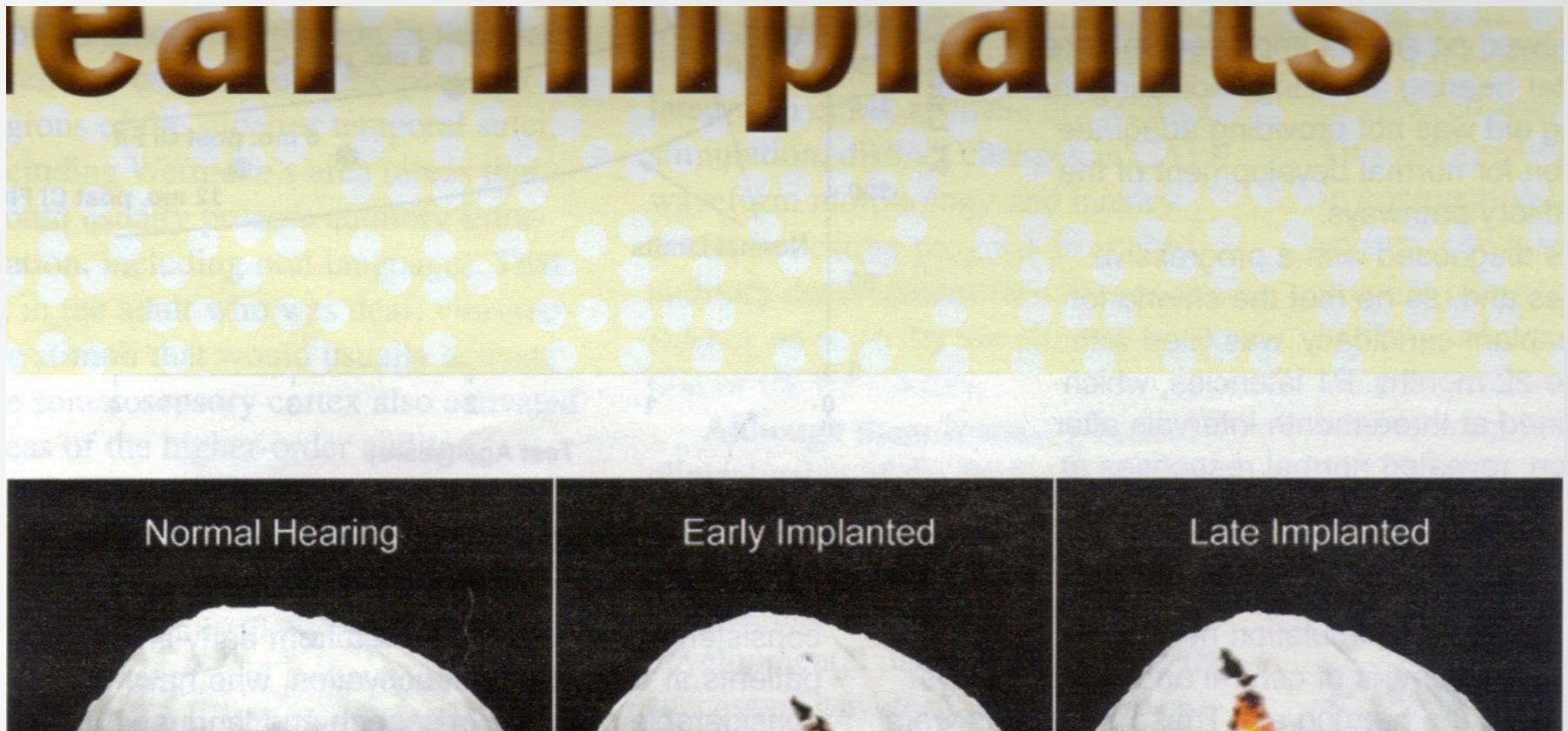


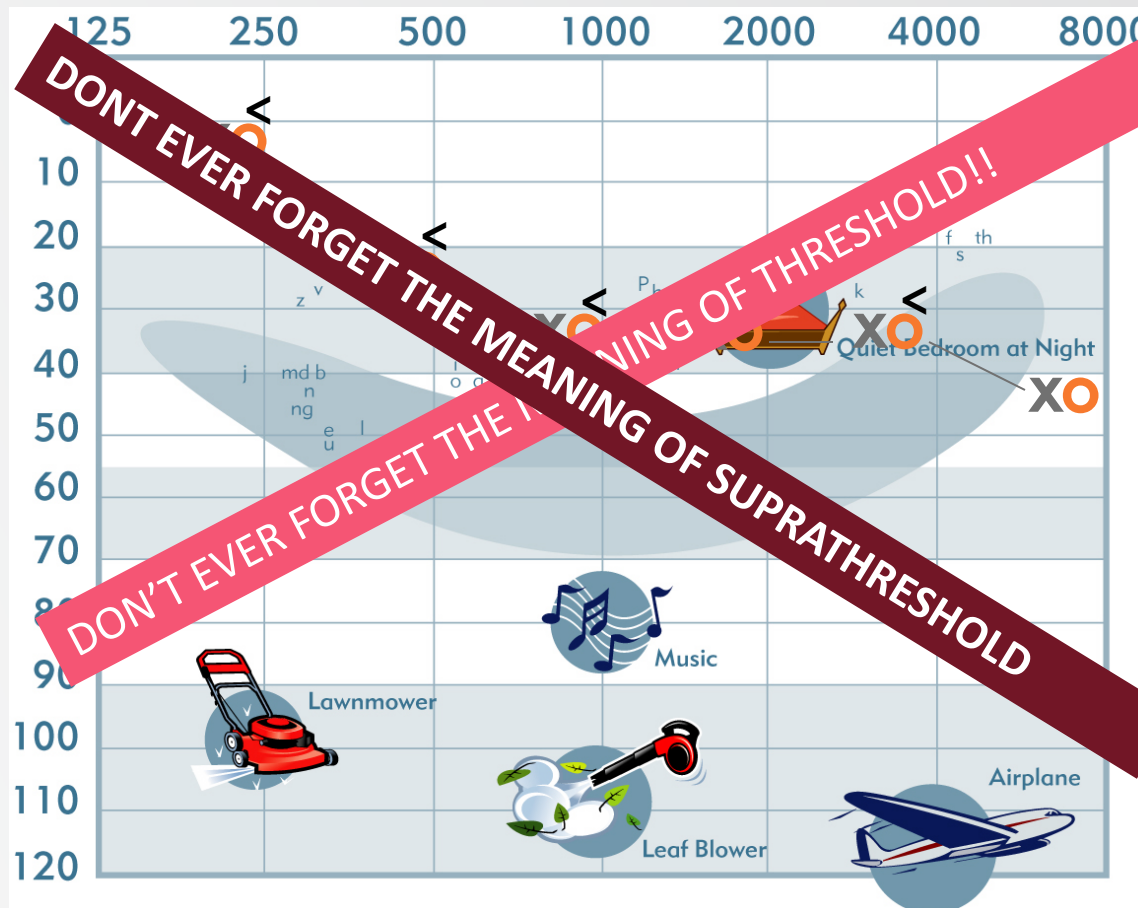
Figure 1. Activation of cortical areas in Response to sound stimulation normal-hearing (left panel), early-implanted (middle panel), and late-implanted (right panel) children. Only normal-hearing and early-implanted children show activation in the auditory cortical areas. Figure adapted from Gilley, Sharma, & Dorman, 2008, *Brain Research*, 1239, 56-65.

Knowledge of the Therapist

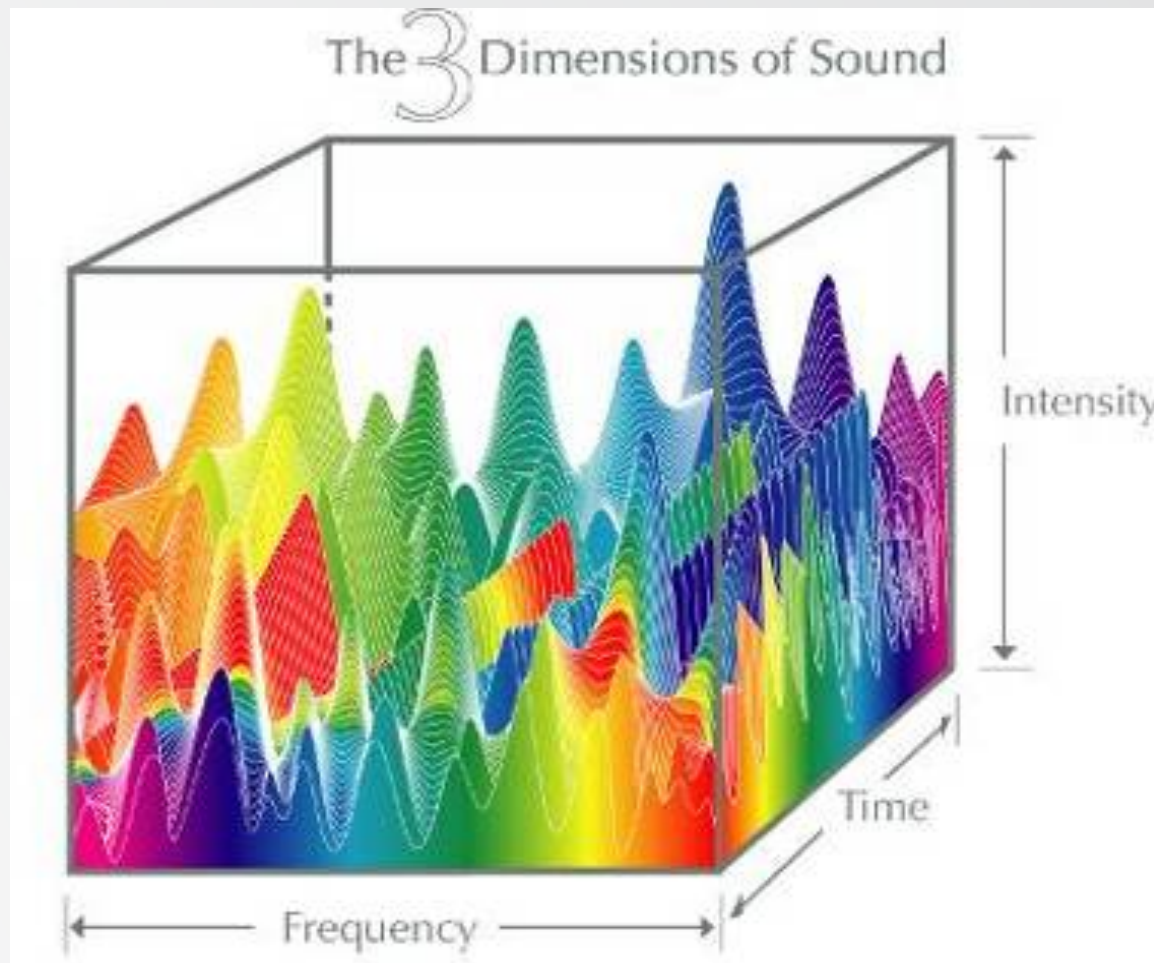
Knowledge of Auditory Development



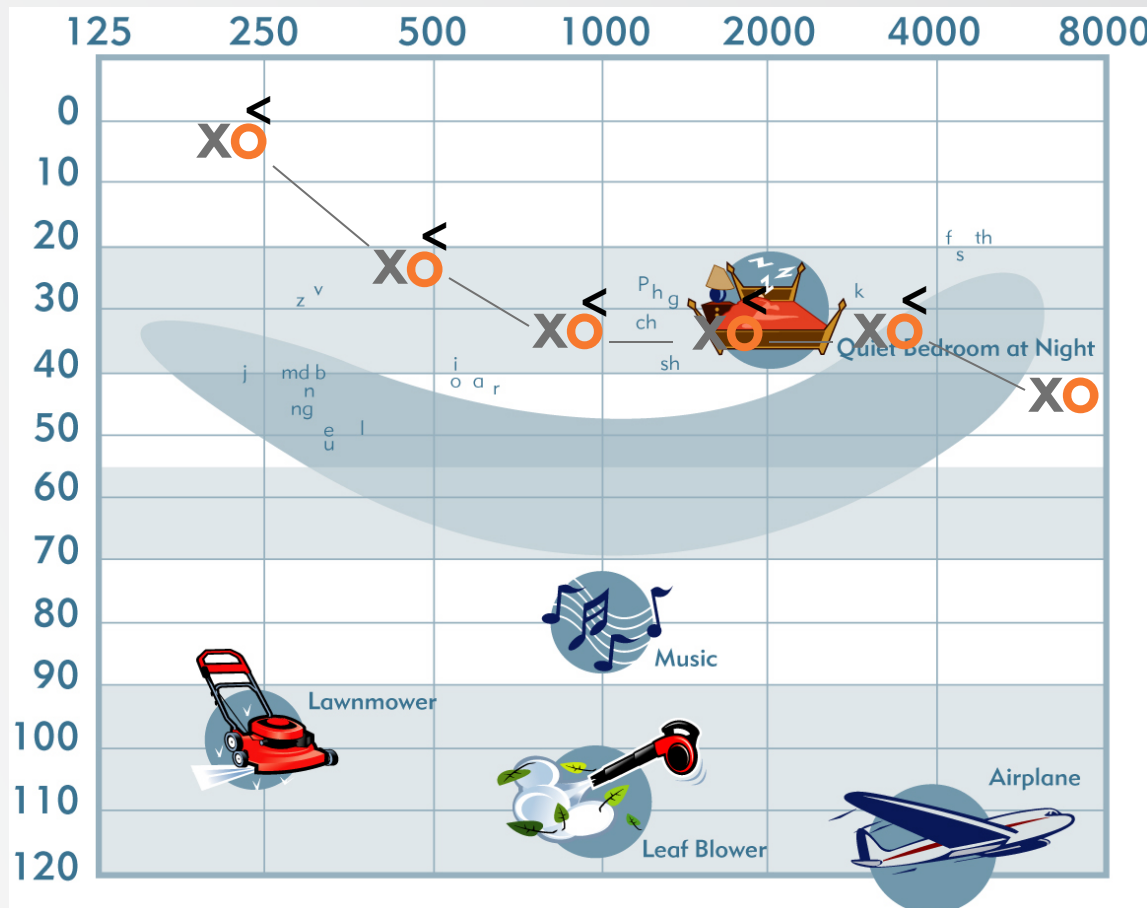
Knowledge of Audiograms



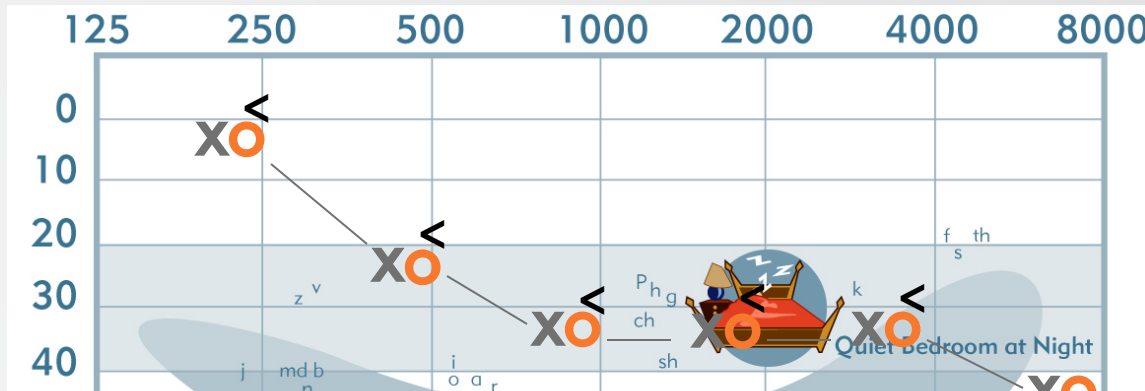
What CAN we Presume From an Audiogram?



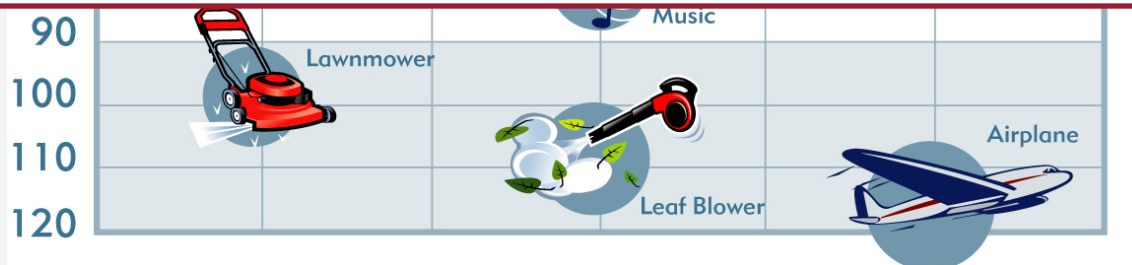
Which dimensions of sound do you see?



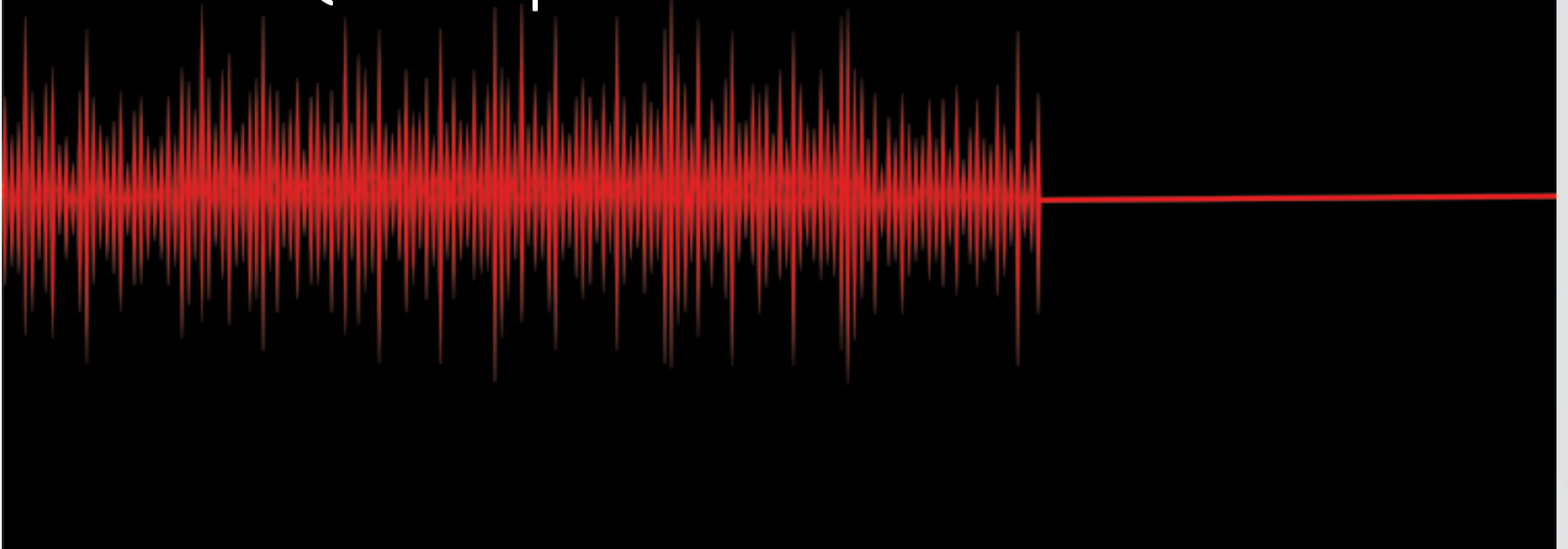
What can we presume from an audiogram?



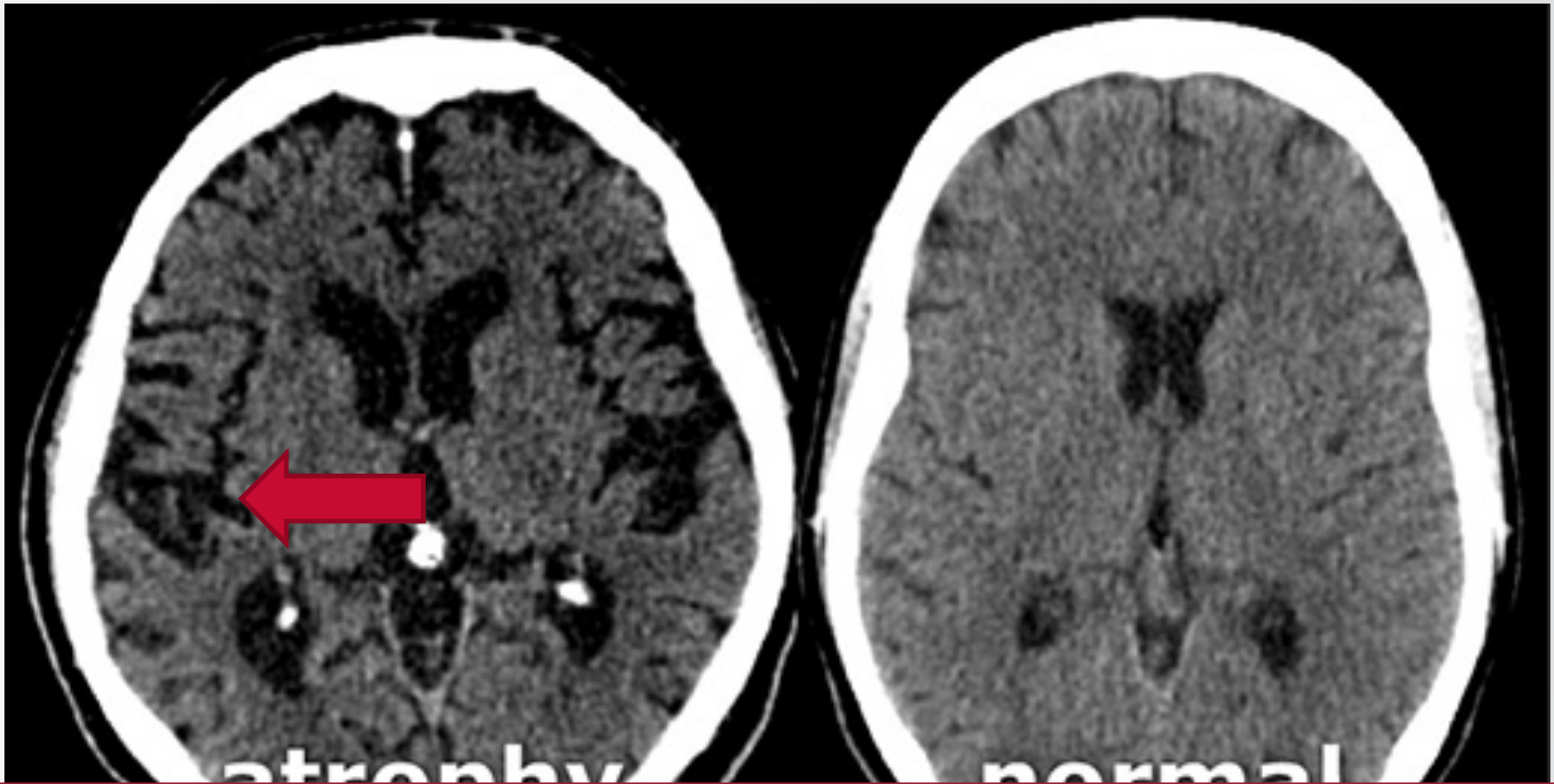
What can we NOT presume from an audiogram?



Quick Gaps in Duration

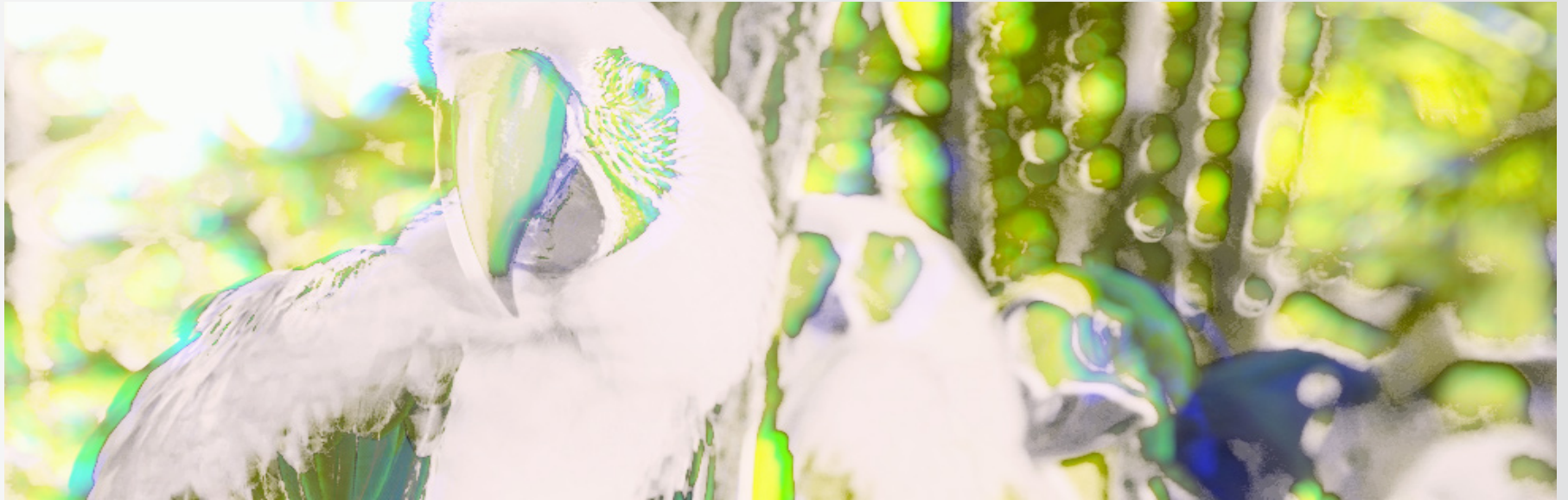


What can we NOT presume from an audiogram?



What can we NOT presume from an audiogram?

CLARITY OF SPEECH



What can we NOT presume from an audiogram?

The majority of children with hearing loss have useful residual hearing;

a fact known for decades

(Bezold & Siebenmann, 1908; Goldstein, 1939; Urbantschitsch, 1982).

USEFUL FOR WHAT?!

DETECTION of sound ALONE

**Is NOT “*useful*” ENOUGH to
facilitate**

Spoken Language Development

OVERALL:

Audiograms tell us information about

Audibility

NOT

Clarity

Knowledge of Appropriate Assessment
Ling Six (Seven) Sound Test



AH

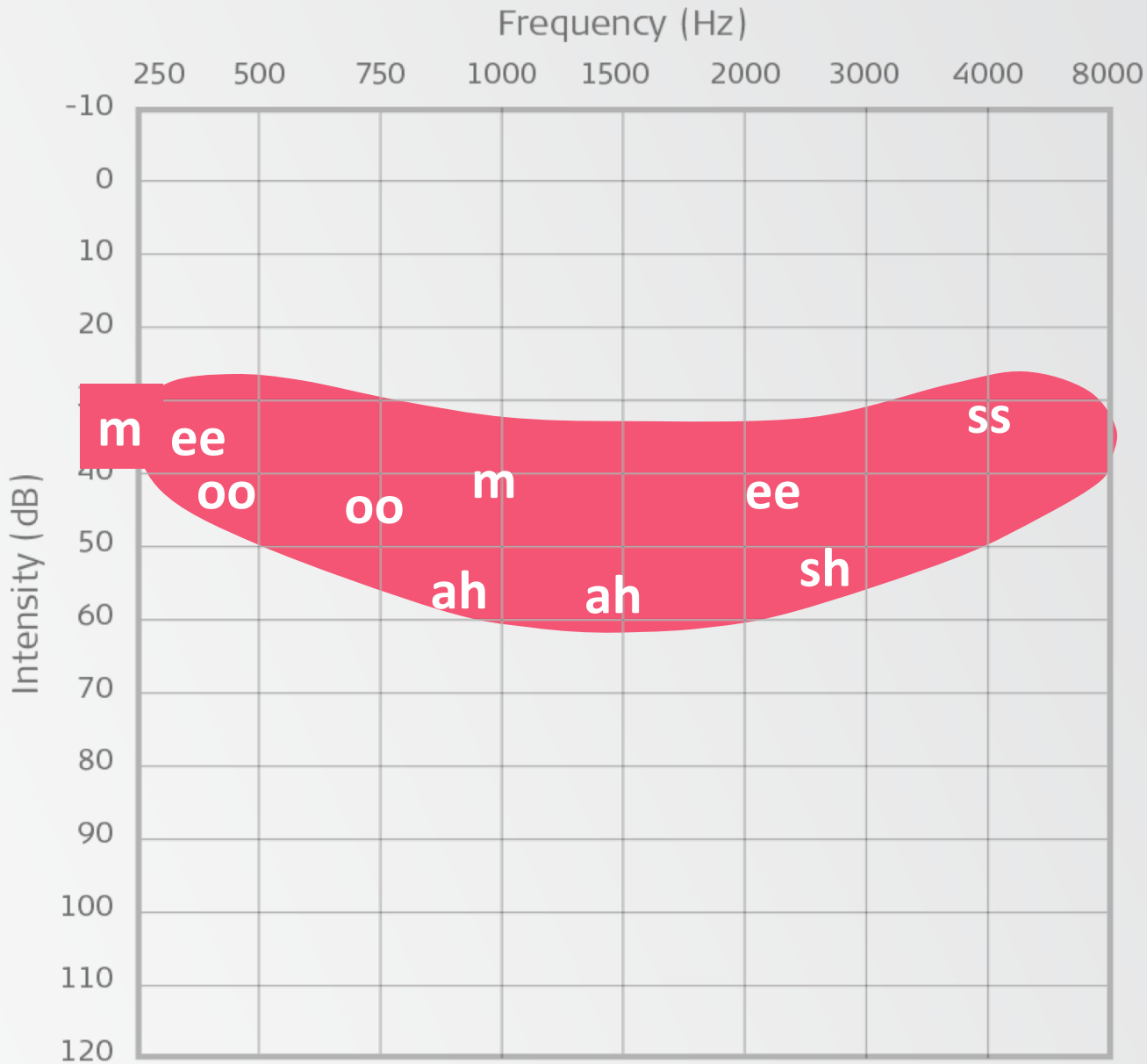
OO

EE

MM

SH

SS

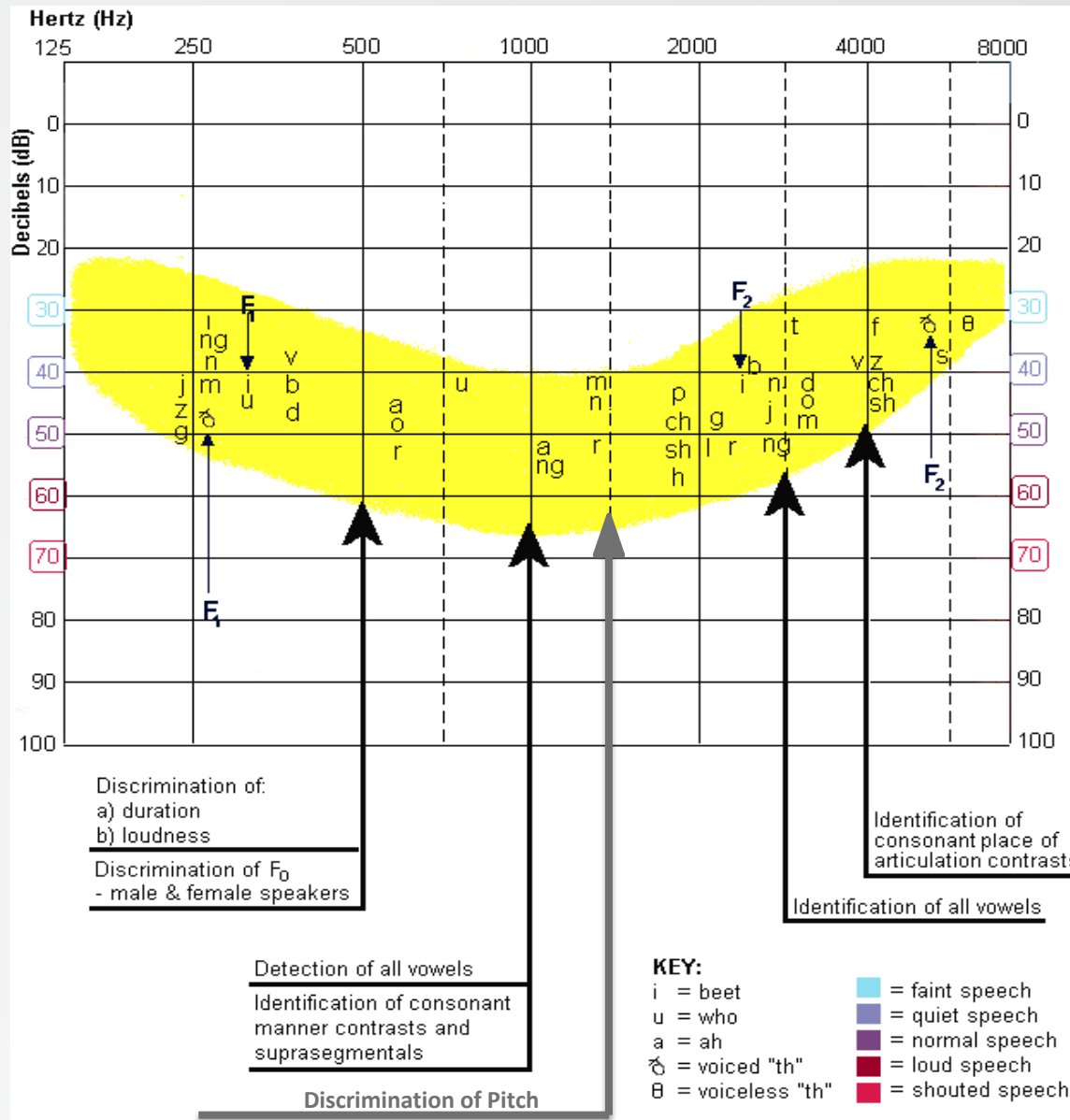


Detection =
F1 AUDIBILITY

Imitation =
F2 CLARITY

Manner
Voice
Place

Duration
Intensity
Pitch



Knowledge of Age-Appropriate Assessment Tasks

Visually Reinforced Tasks

Conditioned Play Tasks

Knowledge of Spoken Language Development



Skills of the Therapist

2 SKILLS:

OBSERVE and **LISTEN!**

Auditory Responses

What am I observing?

Observe

Rehabilitation

MED^oEL

LittleEars[®]

Auditory Questionnaire



LittleEars[®] Auditory Questionnaire

BRIDGE
to better communication

hearLIFE

OBSERVE DETECTION SKILLS:

Ling Six (Seven) Sound Test



AH

OO

EE

S

SHH

M



Accurate Speech Imitations

What am I listening for?

Listen

LISTEN for Imitations of
Ling Six (Seven) Sound Test



AH

OO

EE

S

SHH

M



Imitation of Suprasegmentals



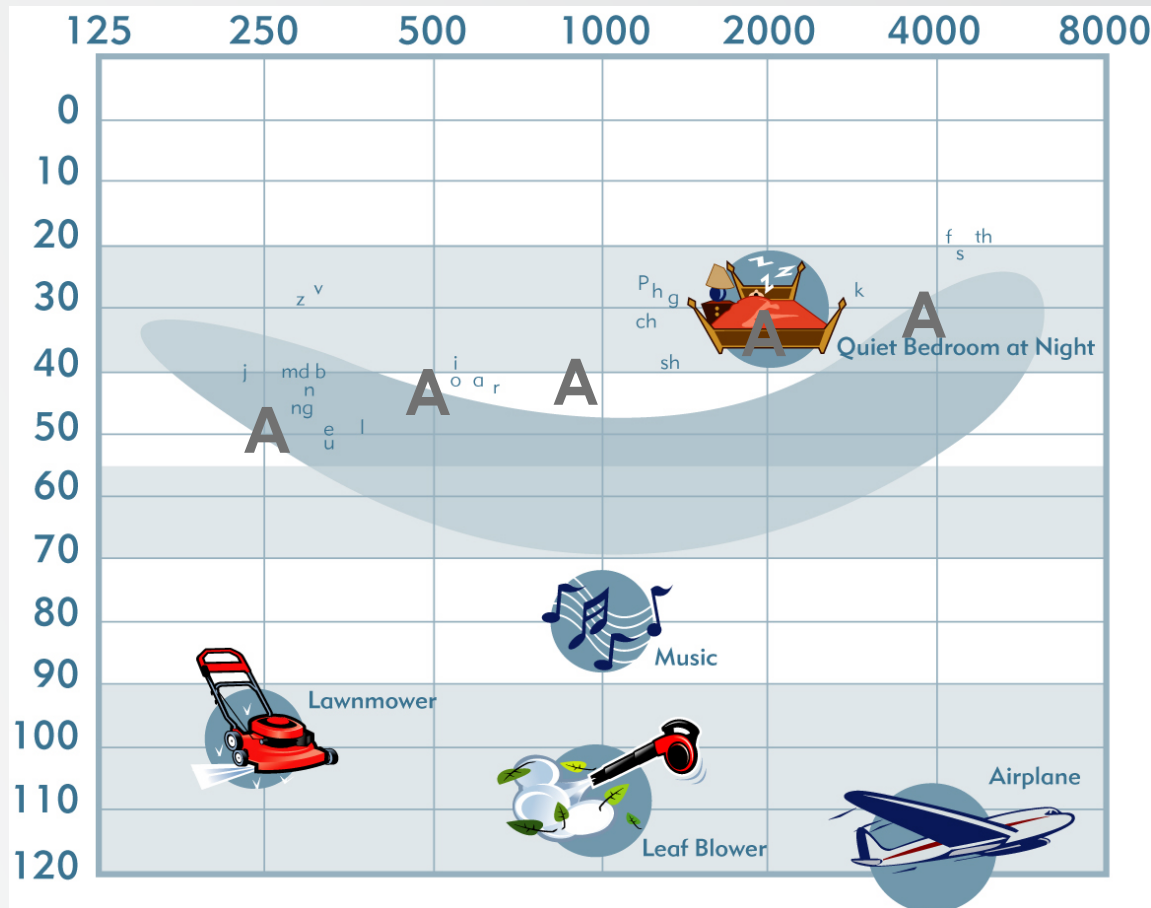
Make Notes of RELEVANT Imitations

Suprasegmentals	Vowels	Consonants	Error Types
Duration	Back <i>/u/</i>	Voice	Omissions
Intensity Loudness	Mid <i>/a/</i>	Manner	Substitutions
Pitch	Front <i>/i/</i>	Place	Distortions

Worksheet

Observing and Listening Exercise

Aided Audiogram - Pre



Aubrie Pre-HA Adjustment

What could you say?

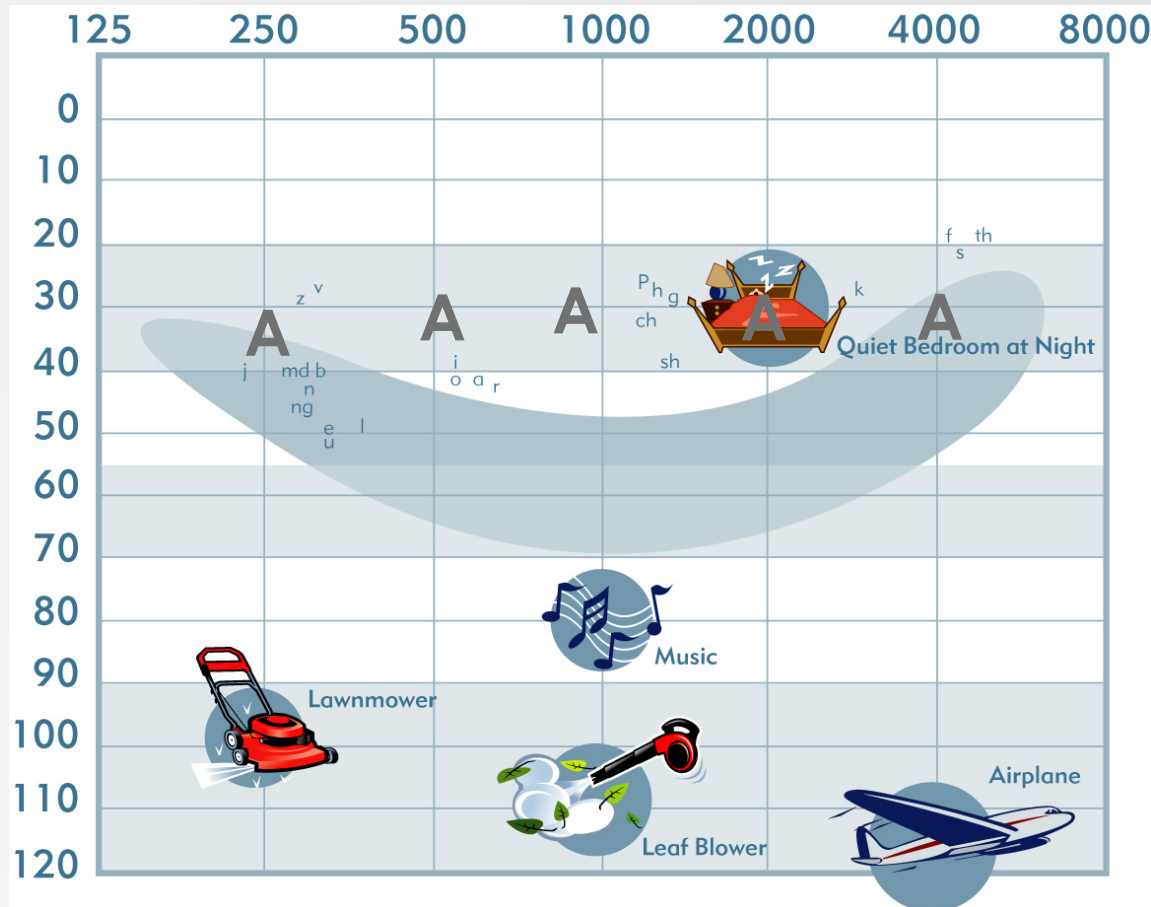
Detection

Were all sounds audible?

Identification

Were all sounds clear?

Aided Audiogram - Post



Aubrey Post HA Adjustment

What could you say?

Detection

Were all sounds audible?

Identification

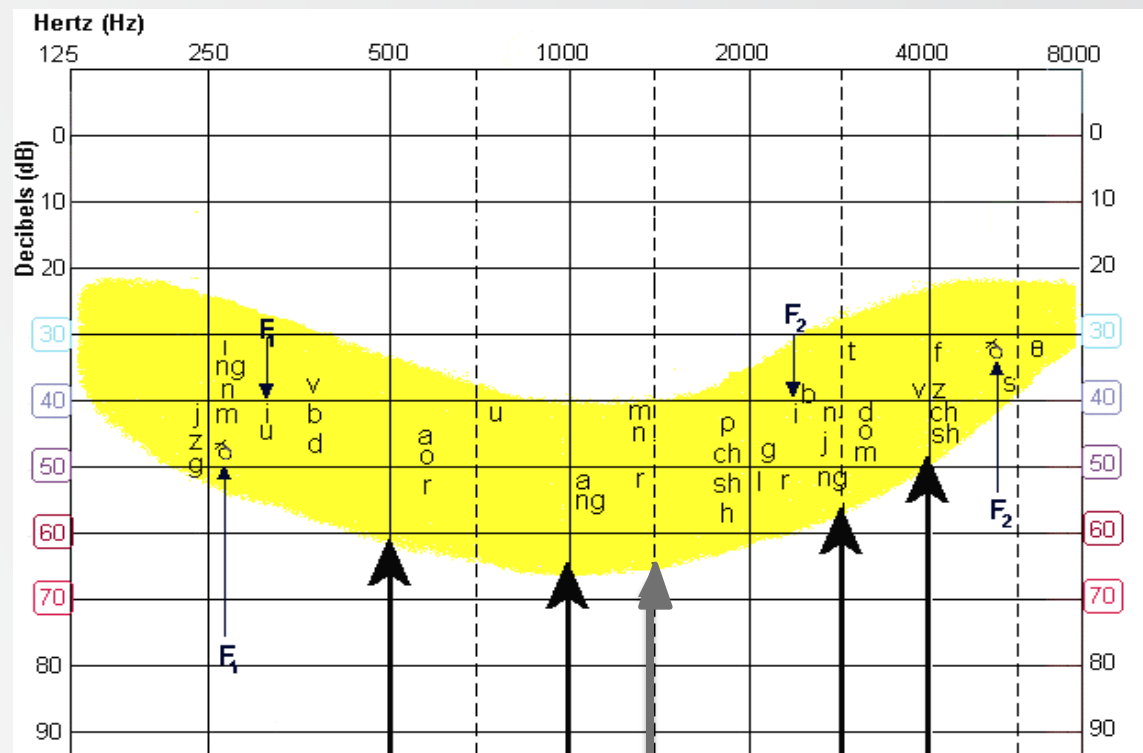
Were all sounds clear?

Write down what you observe and hear

Aubrey

ID
Suprasegs

What did you observe and hear?



<p>Discrimination of: a) duration b) loudness</p> <p>Discrimination of F_0 - male & female speakers</p>	<p>Identification of consonant place of articulation contrasts</p>										
<p>Detection of all vowels</p> <p>Identification of consonant manner contrasts and suprasegmentals</p>	<p>Identification of all vowels</p>										
<p>Discrimination of Pitch</p>	<p>KEY:</p> <table> <tr> <td>i = beet</td> <td>light blue = faint speech</td> </tr> <tr> <td>u = who</td> <td>blue = quiet speech</td> </tr> <tr> <td>a = ah</td> <td>purple = normal speech</td> </tr> <tr> <td>θ = voiced "th"</td> <td>red = loud speech</td> </tr> <tr> <td>θ = voiceless "th"</td> <td>dark red = shouted speech</td> </tr> </table>	i = beet	light blue = faint speech	u = who	blue = quiet speech	a = ah	purple = normal speech	θ = voiced "th"	red = loud speech	θ = voiceless "th"	dark red = shouted speech
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What could you say?

Detection

Identification

Were all sounds audible?

Were all sounds clear?

What could you say?

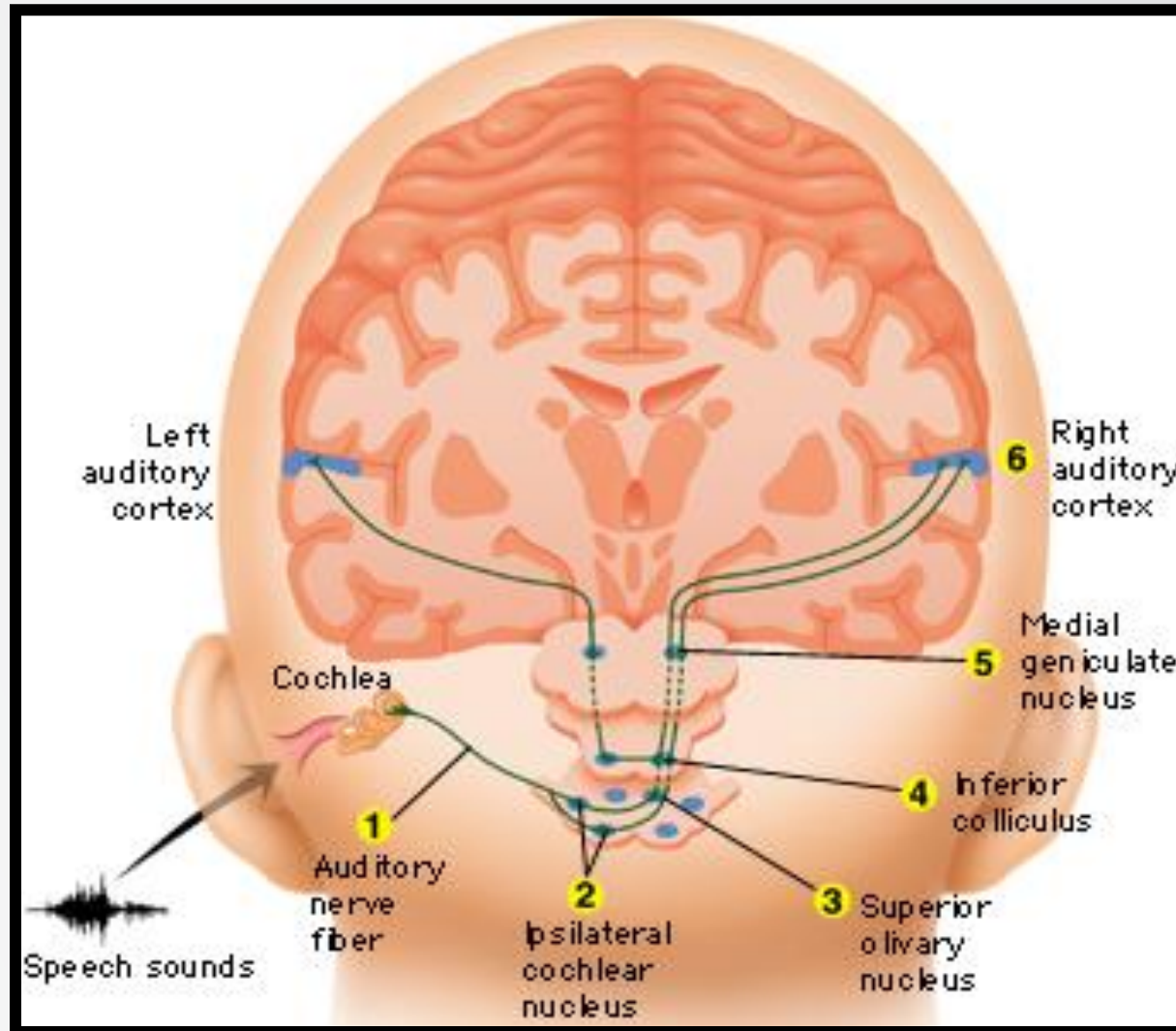
Detection	Identification
<p>Audible?</p> <p>In order for him to detect sound I had to...</p>	<p>Clear?</p> <p>When I said /ah/, he said...</p>

I only have information to share on....

If his auditory potential is so limited, what's the point of the hearing aids?

#1 FAQ

Keeping the Pathway Open



Luke
4 yrs old

Determining Auditory Potential: important to

- Help determine and/or confirm the effectiveness of hearing aid(s) and/or CI candidacy in a timely manner
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